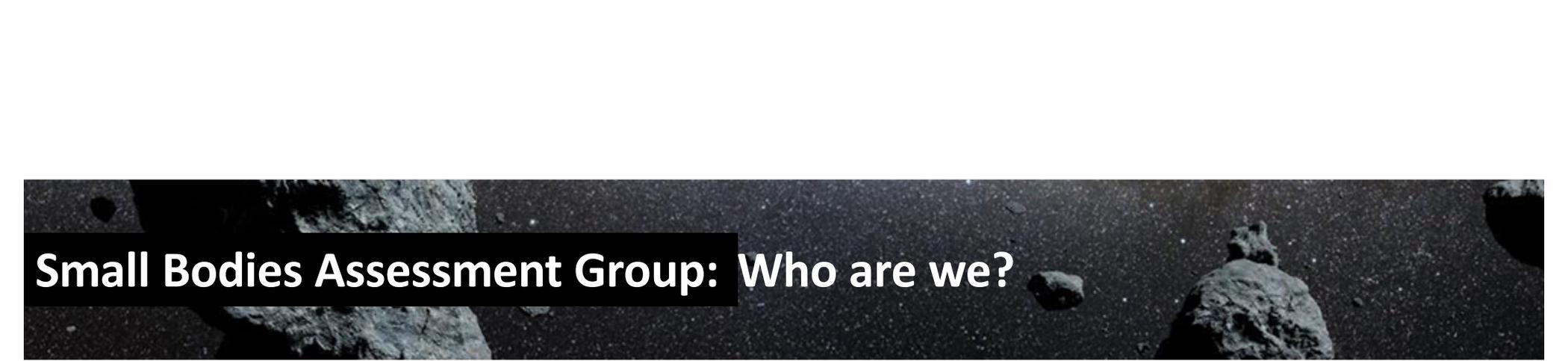


**Bonnie J. Buratti, SBAG Chair**  
December 6, 2019 virtual meeting

[www.lpi.usra.edu/sbag/](http://www.lpi.usra.edu/sbag/)



# Small Bodies Assessment Group: Who are we?

## Steering Committee (general membership open)

Dan Adamo (Independent consultant)

**Human Exploration Lead**

Elena Adams (APL), **Technology Lead**

Maitrayee Bose (Arizona State Univ.)

Bonnie Buratti (NASA JPL) **Chair**

Terik Daly (APL), **Early Career Secretary**

Mike DiSanti (NASA Goddard)

Jesse Dotson (NASA Ames) **Planetary**

**Defense Lead**

Carolyn Ernst (APL)

David Gerdes (U. of Michigan)

Andy Rivkin (APL)

Jennifer Scully (JPL)

Hannah Susorney (U. of British

Columbia), **Early Career Secretary**

Tim Swindle (U. of Arizona), **Past**

**Chair**

Patrick Taylor (LPI)

**Steering Committee selects Chair and Steering Committee members from among nominations, applications**

## What does SBAG do?

- Seeks broad planetary science community input on small bodies and missions to small bodies.
- SBAG Charter (2008) lists asteroids, comets, interplanetary dust, small satellites, and Trans-Neptunian Objects; we also include Centaurs, meteorites, and planetary defense.
- Holds open meetings twice each year for community participation; usually in June and January
- Maintains a Goals Document.
- Makes findings: community-based concerns and issues that need to be addressed.

## The SBAG goals document

- Last goals document completed March 2016.
- Revised goals document nearly complete: new material on ISRUs (In-Situ Resource Utilization); diversity (with other AGs); and NEOs nearing completion.
- Revised Goals Document to be posted on the website by the end of the year.
- New document preserves the three goals listed on the right; will include ISRU as a fourth goal.

### **Goal 1: Small Bodies, Big Science.**

Investigate the Solar System's formation & evolution & advance our knowledge about the early Solar System conditions necessary for the origin of life through research & exploration uniquely enabled by small bodies.

### **Goal 2: Defend Planet Earth.**

Understand the population of small bodies that may impact our planet & develop ways to defend the Earth against any potential hazards.

### **Goal 3: Enable Human Exploration.**

Advance our knowledge of potential destinations for human exploration within the small body population & develop an understanding of the physical properties of these objects that would enable a sustainable human presence beyond the Earth-Moon system.

## Small bodies missions

- Two asteroid sample return missions arrived at targets: OSIRIS-REx (NASA), Hayabusa2 (JAXA; sample collected).
- New Horizons: extended mission to study KBOs remotely.
- NEOWISE: sizes and albedos of NEOs.
- Psyche and Lucy (selected on Discovery 2013): investigate different stages in Solar System development from study of a metallic asteroid (16 Psyche) and primitive planetesimals (Jupiter Trojans), respectively.
- Other missions: DART (kinetic impactor planetary defense demo) and Destiny+ dust mission (JAXA), Comet Interceptor (ESA “Fast-class”; NASA Co-I & collaborators); Hera (ESA)
- Support for NEO Surveillance

# Current and Approved Future Missions to Small Bodies in the Solar System



**Psyche**  
*future*  
NASA

**OSIRIS-REx**  
*current* NASA

**MMX**  
*future*  
JAXA

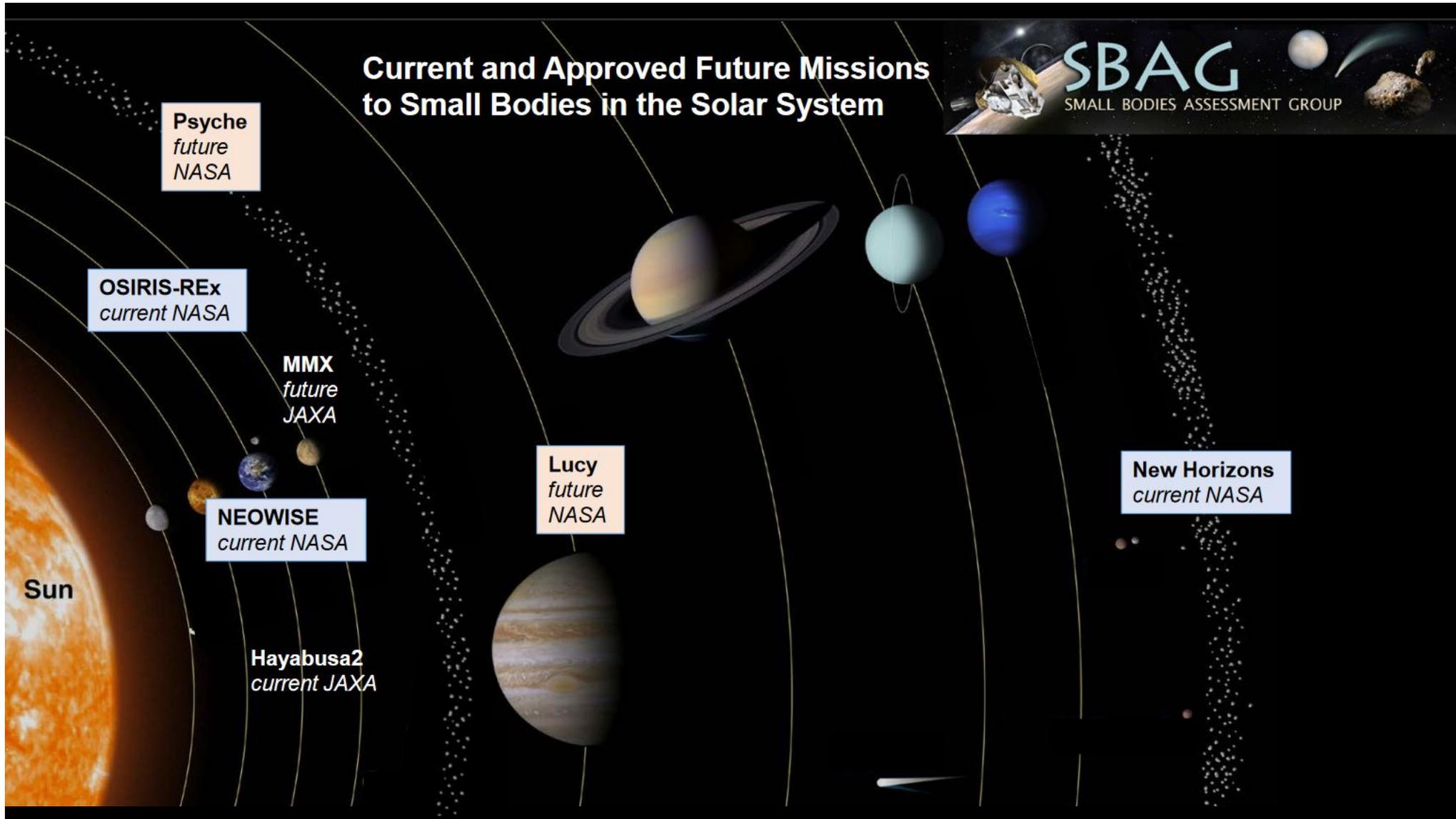
**NEOWISE**  
*current* NASA

**Hayabusa2**  
*current* JAXA

**Lucy**  
*future*  
NASA

**New Horizons**  
*current* NASA

Sun



## Significant June 2019 findings

- SBAG emphasizes the importance of including planetary defense priorities in the upcoming Decadal Survey.
- SBAG reiterates its support for a space-based infrared asteroid survey to discover, detect, track, and characterize small bodies, especially those that may be potentially hazardous to Earth. This finding is based on a National Academies Report.
- SBAG supports continued Center for Near Earth Object Studies (CNEOS) Near-Earth Object Human Space Flight Accessible Targets Study (NHATS) processing and associated public webpage postings.
- SBAG expresses its enthusiastic support for including a Participating Scientist Program (PSP) in current and planned mission profiles.
- SBAG urges the National Academies to select a Planetary Decadal Survey Committee that reflects the demographic makeup of the planetary science community.

## Highlights of January 14-16, 2020 meeting in Pasadena

- Overview of missions: Lucy; Psyche; Dart; Hayabusa2; LSST; O-REx; NEOWISE: NEO Surveillance; Parker Solar Probe (sun-grazing comets); Hera; Arecibo and Goldstone
- Other: NASA Managers' presentations; reports on Arecibo and Goldstone; HEOMD; NHATS update; DPS and MPC reports; early career and lightning talks
- Open mic time
- Kick-off (workshop style) of Decadal white papers: preliminary list of papers and authors
- (New) present preliminary findings on last day for additional community input

## Big questions for the decadal report (presented at last PAC mtg.)

- What do small bodies tell us about the formation of the Solar System and the conditions in the early solar nebula?
- What does the distribution, composition, and sizes of small bodies tell us about the evolution of the Solar System, including its dynamical history, cratering processes, and the influx of volatiles and organics into the inner Solar System?
- Do sustainable habitable environments exist on any of the small bodies?
- What are the main geological processes that determined the evolution and current state of the small bodies and are they similar to those on larger bodies?
- What threat do Near-Earth Objects pose to civilization and life on Earth, and how can we quantify and mitigate that threat?

## Other decadal thoughts and issues

- SBAG plans to produce a small number (less than a dozen) broadly supported white papers to assist the Decadal Survey Committee.
- SBAG supports the idea of science-based criteria driving the Decadal Survey. Plan now is to start with concepts, with targets and missions to follow
- Overlap exists between the exploration goals of SBAG and the other AGs. Examples are moons of the gas and ice giants, as well as Phobos and Deimos. We therefore propose joint white papers among AGs.